1. Complete the Borda Method on the preference schedule below. Is there anything that bothers you about the winner?

	21	10	9
1st (3 pts)	A	B	B
2nd (2 pts)	B	C	C
3rd (1 pt)	C	A	A

A = 3(21) + 1(10) + 1(9) = 82

B = 2(21) + 3(10) + 3(9) = 99 ← B wins under Borda count!

C = 1(21) + 2(10) + 2(9) = 59

Total # of votes = 40

majority = 21

1st choice votes: A = 21 ← A has a majority of 1st choice votes!

B = 19

C = 0

Majority Criterion

A candidate who receives a majority of 1st place votes should win the election!

2. (Example 11) Below is a preference schedule (left) and the results from all one-to-one matchups (right).

	5	5	6	4
1st	D	A	C	B
2nd	A	C	B	D
3rd	C	B	D	A
4th	B	D	A	C

matchup	A vs. B	A vs. C	A vs. D	B vs. C	B vs. D	C vs. D
tally	A : 10 B : 10	A : 14 C : 6	A : 5 D : 15	B : 4 C : 16	B : 15 D : 5	C : 11 D : 9
winner	tie	A	D	C	B	C

Copeland's tally: A: 1 + ½ = 3/2, B: 1 + ½ = 3/2, C: 2, D: 1

C wins under Copeland's Method.

Suppose candidate D wasn't there?

	5	5	6	4
1st	~~D~~	A	C	B
2nd	A	C	B	~~D~~
3rd	C	B	~~D~~	A
4th	B	~~D~~	A	C

A v B	10 to 10	tie
A v C	14 to 6	A wins
B v C	4 to 16	C wins

A wins!

Copeland

A = ½ + 1

B = ½

C = 1

Independence of irrelevant alternatives

- If you eliminate a non-winning candidate from the ballot it shouldn't change the outcome of the election, or
- If candidate X is preferred over candidate Y, that shouldn't change just because candidate Z is included

3. Recap of **Fairness Conditions**

Condition	Pass	Fail
IIA		Copeland, Borda, IRV, Plurality
Majority	IRV, Copeland, Plurality	Borda
Monotonicity	Copeland, Plurality, Borda	IRV
Condorcet	Copeland*	Plurality, IRV, Borda

(Wikipedia has a great chart – see Borda Count article)

Arrow's Impossiblity Theorem

You can't have a voting method that satisfies all the fairness conditions simultaneously!

4. Approval Voting

	30	15	10	10
Anchorage	X	X		
Bettles	X		X	X
Chevak		X		X

Voters vote for all the choices they approve of!

Count the total # of approvals

X = approve
☐ = disapprove

A = 30+15 = 45

B = 30+10+10 = 50 ← winner

C = 15+10 = 25

* Vulnerable to insincere voting!

If the 30 voters in column 1 only vote for A (because they prefer A to B) then they will guarantee A wins (even though they in reality are also ok with B)

Red Pen Quiz Corrections

Instructions

You are encouraged to talk to your classmates and compare your quizzes!

1. Put everything away except your quiz and a calculator
2. Come get a red pen
3. **Circle** your error. **Do not scribble out!**
4. **Write** what your error was
5. **Fix** your error, including showing supporting work/calculations if necessary.